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~~21~~
40. A polisher as claimed in claim ~~39~~²⁰, wherein said at least one light source transmits light through the substrate and said at least one reflected light signal has at least one wavelength between about 1,000 nanometers and about 11,000 nanometers.

~~22~~
41. A polisher as claimed in claim ~~39~~²⁰, wherein only one section is illuminated which is a dedicated measurement area.

~~23~~
42. A polisher as claimed in claim ~~39~~²⁰, wherein more than one section is illuminated.

~~24~~
43. An apparatus for monitoring thickness change in a film on one side of a substrate having two sides comprising a light source that illuminates a section of the film on one side of the substrate to create a reflected light signal and a decoupler which decouples the reflected light signal from rotation, said decoupler being operably connected to means for monitoring thickness change based on the reflected light signal.

~~25~~
44. The apparatus as claimed in claim ~~43~~²⁴ wherein the light source transmits light through the substrate from the side of the substrate without the film.

~~26~~
45. The apparatus as claimed in claim ~~43~~²⁴ wherein the light source transmits light from the side of the substrate with the film to each section on the film that is monitored.

~~27~~
46. The apparatus as claimed in claim ~~43~~²⁴ wherein the decoupler comprises an electrical slip ring or a fiber-optic rotation decoupler.

~~28~~
47. The apparatus as claimed in claim ~~43~~²⁴ wherein the means for monitoring thickness change based on a reflected light signal

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comprises a photodetector connected to an interferometer or a spectrophotometer.

48. A chemical mechanical polisher for planarizing a film on one side of a substrate having two sides comprising at least one light source that transmits light through the substrate from the side of the substrate without the film to at least one section on the film, thereby creating at least one reflected light signal that is received by at least one means for monitoring thickness change based on the reflected light signal.

49. The polisher as claimed in claim 48 wherein said at least one means for monitoring thickness change based on the reflected light signal comprises a photodetector connected to an interferometer or a spectrophotometer.

50. The polisher as claimed in claim 48 wherein each monitored section is minimized in size to remove signal problems.

51. The polisher as claimed in claim 48, wherein only one section is illuminated which is a dedicated measurement area.

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52. The polisher as claimed in claim ⁴⁸~~47~~, wherein more than one section is illuminated.

²⁹
~~53~~. An apparatus for monitoring thickness change in a film on one side of a substrate having two sides, said apparatus comprising at least one light source that illuminates at least one section of the film on the substrate to create at least one reflected light signal that is received by at least one decoupler that decouples the reflected light signal from rotation and transmits the reflected signal to at least one device that monitors thickness change based on the reflected light signal.

D1
³⁰
~~54.~~ The apparatus as claimed in claim ²⁹~~53~~ wherein the at least one light source transmits light through the substrate from the side of the substrate without the film.

³¹
~~55.~~ The apparatus as claimed in claim ²⁹~~53~~ wherein each monitored section is minimized in size to remove signal problems.


³²
~~56.~~ The apparatus as claimed in claim ²⁹~~53~~, wherein only one section is illuminated which is a dedicated measurement area.

³³
~~57.~~ The apparatus as claimed in claim ²⁹~~53~~, wherein more than one section is illuminated.

³⁴
~~58.~~ The apparatus as claimed in claim ²⁹~~53~~, wherein the at least one light source transmits light from the side of the substrate with the film to each section on the film to be illuminated.

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³⁵
~~59.~~ The apparatus as claimed in claim ²⁹~~53~~ wherein the at least one decoupler that ~~is~~^{de}couples the reflected light signal from rotation comprises an electrical slip ring or a fiber-optic rotation decoupler.

³⁶
~~60.~~ The apparatus as claimed in claim ²⁹~~53~~ wherein the device that monitors thickness change based on the reflected light signal comprises a photodetector connected to an interferometer or a spectrophotometer.

Subst. 71 
~~61.~~ A chemical mechanical polisher for planarizing a film on one side of a substrate having two sides comprising at least one light source that transmits light through the substrate from the side of the substrate without the film to at least one section on the film creating at least one reflected light signal that is received by at least one device that monitors thickness change based on the reflected light signal.

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62. The polisher as claimed in claim 61 wherein the at least one device that monitors thickness change based on the reflected light signal comprises a photodetector connected to an interferometer or a spectrophotometer.

63. The polisher as claimed in claim 61 wherein each monitored section is minimized in size to remove signal problems.

64. The polisher as claimed in claim 61, wherein only one section is illuminated which is a dedicated measurement area.

65. The polisher as claimed in claim 61, wherein more than one section is illuminated.

Subst. 72

66. A chemical mechanical polisher for planarizing a film on one side of a substrate having two sides comprising at least one light source that transmits light from the side of the substrate with the film to at least one section on the film, thereby creating at least one reflected light signal that is received by at least one device that monitors thickness change based on the reflected light signal.

67. The polisher as claimed in claim 66 wherein the at least one device that monitors thickness change based on the reflected light signal comprises a photodetector connected to an interferometer or a spectrophotometer.

68. The polisher as claimed in claim 66 wherein each monitored section is minimized in size to remove signal problems.

69. The polisher as claimed in claim 66, wherein only one section is illuminated which is a dedicated measurement area.

70. The polisher as claimed in claim 66, wherein more than one section is illuminated.

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71. A chemical mechanical polisher for planarizing a film on one side of a substrate having two sides comprising at least one light source that transmits light from the side of the substrate with the film to at least one section on the film, thereby creating a reflected light signal that is received by at least one means for monitoring thickness change based on the reflected light signal.

72. The polisher as claimed in claim 71 wherein said at least one means for monitoring thickness change based on the reflected light signal comprises a photodetector connected to an interferometer or a spectrophotometer.

73. The polisher as claimed in claim 71 wherein each monitored section is minimized in size to remove signal problems.

74. The polisher as claimed in claim 71, wherein each monitored section is minimized in size to remove signal problems.

75. The polisher as claimed in claim 71, wherein only one section is illuminated which is a dedicated measurement area.--

REMARKS

Claims 17-35 and 37-75 are pending.

Claims 17-38 have been allowed or indicated allowable over the prior art.

Claims 36-38 have been canceled and rewritten as new claims 39-41 following the Examiner's helpful suggestion.

Claims 42-75 have been added to cover additional embodiments to which applicant is entitled. These new claims cover embodiments that should be allowable for the same reasons that claims 17-38 were indicated allowable. Additionally, applicants point out that direct, real-time, optical monitoring of thickness change during CMP was made possible for the first time by the present invention. Also, real-time monitoring of CMP